

Annual Report on the Status of  
California State Listed  
Threatened and Endangered  
Animals and Plants



1992

State of California  
The Resources Agency  
Department of Fish and Game



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**THE STATE OF CALIFORNIA**

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**RESOURCES AGENCY**

*Douglas P. Wheeler, Secretary for Resources*

**DEPARTMENT OF FISH AND GAME**

*Boyd Gibbons, Director*



*Cover illustration by Susan Thomas  
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*Our goal is to publish an accurate and informative document. Should you discover an error, or if you have new information you would like to share with us, please contact:*

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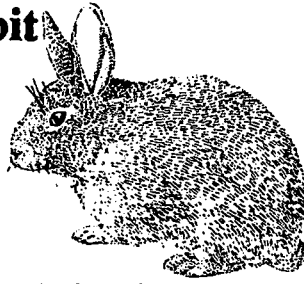
# Riparian Brush Rabbit

(*Sylvilagus bachmani riparius*)

CA - C (1992)

Fed - C1 (1989)

General Habitat: • Riparian Forest



The Riparian Brush Rabbit is an isolated subspecies of the Brush Rabbit. Comprising eight subspecies and considered a game animal, the Brush Rabbit is generally widespread in California. However, the Riparian Brush Rabbit is only found in Caswell Memorial State Park in southern San Joaquin County. The entire population is restricted to 261 acres of remaining native riparian forest running in a strip along the Stanislaus River.

The Riparian Brush Rabbit can be distinguished from other Brush Rabbit subspecies by its isolated location and its skull characteristics. When looking down at the head from above, their cheeks protrude outward rather than being straight or curving inward. They are small brown rabbits with a white belly, relatively short ears, and an inconspicuous tail. A similar species, the Desert Cottontail (*S. audubonii*), also occurs in the San Joaquin Valley. They are slightly larger, have larger eyes and ears, are more grayish and yellowish in coloration, and have a very conspicuous tail. The belly hair of a Brush Rabbit is black near the skin with white tips, while that of a Desert Cottontail is pure white.

Riparian Brush Rabbits are only found in San Joaquin Valley native riparian areas with large clumps of dense shrubs, low growing vines, and some tall shrubs and scrubby trees. California wild rose (*Rosa californica*) and Pacific blackberry (*Rubus vitifolius*), along with downed logs and dead snags, are typically present. As this vegetation occurs within the floodplain, some elevated land or tall trees or snags are necessary for flood avoidance. There also must be areas with enough breaks to allow growth of sedges, forbs and grasses close to brushy cover. Grasses are the most important food and Riparian Brush Rabbits rarely venture more than one to two yards from dense cover. The animals are most active in the early morning and evening hours.

The breeding season for this rabbit is typically from January to May, with a peak between mid-January and mid-April. Gestation is about 27 days, and females may breed again shortly after giving birth. About three to four litters per female may be produced during the breeding season, with three to four young per litter. Young are born in a nest cavity lined with fur and covered with a grass plug. The young have fine thin hair at birth and open their eyes in ten days. They remain in the nest about two weeks before they venture out and then they continue nursing for another two to three weeks. They mature in four to five months. They do

not breed until the winter following their birth and do not disperse very far. Riparian Brush Rabbits do not have a high reproductive rate (as occurs in other rabbit species), their population turnover is rapid, and their survival rate is low.

The population has undergone a serious long-term decline since historic times primarily due to continuing habitat loss. The current population is estimated at 200-300 individuals, but as recently as the mid 1970's, the population dipped to the extreme low of 15 to 20 individuals due to severe flooding. The remaining population is completely isolated and undergoes severe fluctuations. The historic range of the Riparian Brush Rabbit, prior to the construction of dams and levees, was the naturally occurring floodplain of the San Joaquin River and its tributaries from Stanislaus County to the Delta. This area initially had sufficient high ground and trees to allow for retreat from flooding, but it has been cleared and used for agriculture, cattle grazing, and residential development. Only 5 to 10% of the original riparian forest remains. The entire remaining Riparian Brush Rabbit population is restricted to a fragment of suitable habitat found at Caswell Memorial State Park. There is no cover on nearby levees to allow retreat from floods, which exposes individuals to drowning and increased predation. Flood control projects typically remove brushy habitat and rip-rap banks. During drought periods, the dense riparian vegetation is subject to wildfires. The threat of disease is always a possibility with such a small isolated population. Competition with Desert Cottontails may be a factor, as well as excess predation by feral or free-ranging cats and dogs. Human disturbances of prime areas in the park and the use of herbicides and pesticides can also cause problems.

The Riparian Brush Rabbit is currently protected on Park property. The Park has been involved in coordinating mosquito abatement activities, covering open valve boxes to prevent entrapment, controlling populations of feral dogs and cats, and curtailing the use of rodenticides. There is currently no recovery plan, but the U.S. Fish and Wildlife Service is including this subspecies in their San Joaquin Valley endangered species recovery planning process.

The California Fish and Game Commission received a formal petition from the California Department of Parks and Recreation requesting Endangered species status for the Riparian Brush Rabbit on August 17, 1992. The petition was forwarded to the Department of Fish and Game for a 90-day initial review for completeness. The Department recommended that the petition be accepted, and the Commission made the Riparian Brush Rabbit an official Candidate species on December 4, 1992. The Department has one year from this date to prepare a status report recommending whether or not the listing is warranted. The Commission will then make the final decision. The Department is currently collecting scientific information and working on this report. In addition, a general management plan for all the rabbit spe-

cies occurring in the State is being prepared.

**M**anagement needs for the Riparian Brush Rabbit include restoring habitat and establishing additional populations within the historic range, constructing habitat mounds for upland retreat and additional fire breaks within the Park, expanding Park property and restoring nearby suitable habitat, insuring protection from hunting, and monitoring populations and all habitat management activities. The first step is to obtain official protection by establishing both State and Federal listing as Threatened or Endangered.

**T**he Riparian Brush Rabbit is considered to be "Stable/Declining" because there is only a single small isolated population that is highly susceptible to severe threats from floods, wildfires, disease, predation, competition, and habitat disturbance.

*Caryla Larsen*

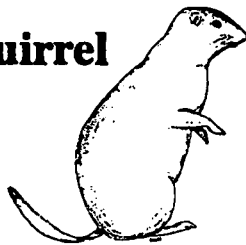
## Mohave Ground Squirrel

(*Spermophilus mohavensis*)

CA - T (1971)

FED - C 2 (1985)

General Habitat: ● Mojavean Desert Scrub  
● Joshua Tree Woodland.



**T**his squirrel is cinnamon-gray in color with white underparts. Juveniles are cinnamon-colored and molt to the gray pelage as they mature. The species lives in underground burrows, in which it spends about seven months of the year (usually from August to February) in estivation. The squirrel eats fruits and seeds of desert plants. The species is resident in the western Mojave Desert. It occurs in southwestern Inyo County, eastern Kern County, northwestern San Bernardino County, and extreme northeastern Los Angeles County. The squirrel inhabits plant communities which are dominated by either creosote (*Larrea tridentata*), Joshua tree (*Yucca brevifolia*) or shadscale (*Atriplex confertifolia*).

**T**he major threat to the existence of the Mohave Ground Squirrel continues to be the destruction or degradation of its habitat. The species suffers from piecemeal loss of habitat and resulting isolation of populations. Some squirrels are protected in the Desert Tortoise Natural Area near California City, but this preserve was established with the habitat requirements of the tortoise in mind. There is no active habitat management where this species occurs, except to remove cattle from a large area of the China Lake Naval Air

Weapons Station in Inyo County as mitigation for geothermal development. The species has been virtually ignored in other Federal land use decisions. Adverse-impact categories (see Table III) include development; agriculture; pesticides, poisons and contaminants; livestock grazing; off-road vehicles; energy development; and climate.

**T**he squirrel is designated as a category 2 (also called candidate 2) species in the latest (November 21, 1991) Federal Register notice of review of vertebrate species. This means that the FWS currently has information which indicates that the squirrel may deserve to be proposed as Endangered or Threatened, but that conclusive data on biological vulnerability and threat are not available. The notice of review lists the status of the squirrel as "Declining", which indicates decreasing numbers and/or increasing threats.

**T**he first DFG five-year status report for the squirrel was written in 1987. In the report, the DFG recommended to the FGC that the Threatened classification be retained.

**M**ohave Ground Squirrel survey guidelines were developed in 1988 and revised in 1989, 1990, and 1991 to help standardize field methods and results. The survey guidelines were used for several field seasons by biological consultants in the planning and execution of studies to determine the presence or absence of the squirrel on project sites. However, it became clear to the DFG in early 1991 that trapping studies, even when done according to the guidelines, could not be relied upon to provide a definitive statement that the squirrel is absent from a site. We had no confidence that a study which resulted in no squirrels being captured really indicated that the species was absent from the site. The negative result could mean that the species was indeed absent or that no animals entered traps.

**A**bsence from a site within the known range of the squirrel does not mean that the site does not provide habitat for the species. Indeed, the DFG believes that the species may use any natural habitat within its range. During a drought, the species responds to lack of sufficient local rainfall by failing to reproduce. Thus, a drought which extends for several years (as did the drought which began in 1986-1987 and continued through 1990-1991) will result in local extirpation of Mohave Ground Squirrel populations, as adults die and no young are born. The range of the species becomes contracted. However, the habitat in such areas does not change in a substantive way. If the Mohave Ground Squirrel can find its way back into these areas, then it will repopulate. In any event, the vegetation of

Total population numbers during historic times are difficult to estimate due to lack of appropriate data collected during that era. However, a crude estimate of historic population based on today's density data and the estimated extent of former range is about 17,164,800 individuals. Today approximately 190,200 individuals, about one percent, remain. All of this habitat and population loss leading to the endangerment of the Tipton Kangaroo Rat was caused by the tremendous increase in conversion of native arid grassland and shrubland communities of the southern San Joaquin Valley to intensive, irrigated agricultural crops (see Table III). The completion of water delivery systems associated with the Central Valley Project prompted much of this agricultural expansion (see Table III).

Tipton Kangaroo Rats are limited to arid land communities of the valley floor in the Tulare Basin in level to nearly level terrain at an elevation of 200 to 300 feet. Woody shrubs such as spiny saltbush (*Atriplex spinifera*), iodine bush (*Allenrolfea occidentalis*), and mesquite (*Prosopis juliflora*) are sparsely scattered over the terrain with scant to moderate ground cover of grasses and forbs. Soils are typically fine-textured and alkaline. Tipton Kangaroo Rats sometimes colonize areas that are flooded in winter and spring. Favored areas may include seepweed (*Suaeda fruticosa*) shrublands which are flooded seasonally or where alkaline water lies close to the surface of the soil year-round. Kangaroo rats in these areas either drown or escape to higher ground during floods (see Table III).

Continued agricultural expansion into the remaining native habitats of the southern San Joaquin Valley threatens the Tipton Kangaroo Rat with extinction. This threat is further increased by the proposed State Water Project and increased water deliveries. Remnant habitats in southeastern Kings, southwestern Tulare and northwestern Kern counties could be cultivated by the year 2000, thereby eliminating the habitat of this subspecies.

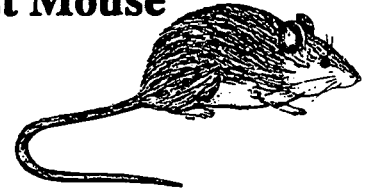
No recovery plan is specifically anticipated for the Tipton Kangaroo Rat; however, cooperative efforts of state and Federal agencies working with local governments and industries hope to protect and preserve some habitat through sensitive regional planning. This species will also be addressed in the federal recovery strategy for the San Joaquin Valley species mentioned previously. Participants in this effort include DFG, FWS, TNC, California Energy Commission and appropriate city and county governments. However, Federal and State funds have not been available for needed population studies.

Although potentially difficult to accomplish, a ban of certain rodenticides within the range of the Tipton Kangaroo Rat will be critical to the conservation and recovery of this subspecies (see Table III). The Department must play an active role in the effort to accomplish this important task. Kangaroo rats are highly susceptible to many pesticides including compound 1080, zinc phosphide and anticoagulants. Present regulatory mechanisms are inadequate to prevent poisoning of Tipton Kangaroo Rats along with target species such as California Ground Squirrels (*Spermophilus beecheyi*). The most important need for preservation of this subspecies is to secure in public ownership all of the remaining large blocks of habitat on the valley floor in the Tulare Basin where populations of Tipton Kangaroo Rats still exist. Unfortunately, however, many of the remaining lands may be too small to support populations of this endangered subspecies indefinitely.

This population is considered to be declining.  
Ron Schlorff

### Salt-marsh Harvest Mouse (*Reithrodontomys raviventris*)

CA - E (1971)  
FED - E (1970)



General Habitat: • Marshes and Swamps

This rodent has fur of a rich brown color, with underparts of cinnamon to buffy-white and a unicolor tail. It probably eats plant leaves and stems, particularly those of grasses. The species is endemic to the salt marshes of Suisun, San Pablo, central San Francisco and south San Francisco bays. It inhabits nontidal as well as tidal marshes.

The major threat to the mouse is destruction and degradation of its habitat. Over 3,600 acres of nontidal wetlands in south and central San Francisco Bay, much of it habitat for this species, have been filled or degraded since the mid-1970's. Since 1982, hundreds of acres of nontidal salt marsh in the South Bay have been disced. The impact of the alien red fox and the impact of rodenticide use on the Salt-marsh Harvest Mouse are unknown. Adverse-impact categories (see Table III) include development, agriculture, exotic plants and flood control, and may include introduced predators and competitors and pesticides, poisons and contaminants.

**D**iscing of wetlands, an activity not regulated by the U.S. Army Corps of Engineers, has been employed by interests seeking to obscure the Corps' jurisdiction and circumvent the Clean Water Act and the Federal Endangered Species Act. On July 19, 1990, the U.S. Department of Justice and the USFWS announced that the Gentry-Pierce Business Park near Suisun City had agreed to plead guilty to violating Section 9 of the Federal Endangered Species Act and pay a \$50,000 fine for take of Salt-marsh Harvest Mouse. The violation occurred when the developers disced a 157 acre site known to support this species. According to the Justice Department, this is the first prosecution of an Endangered Species Act violation in California that involves a significant modification or degradation of endangered species habitat.

**M**anagement activities include protection of habitat in national wildlife refuges, State wildlife areas and ecological reserves, and local refuges; review of Federal permit activities through a vigorous Section 7 consultation process (under the Federal Endangered Species Act) conducted by the FWS; periodic surveys in portions of the range to determine status; preparation of a recovery plan which identifies tasks to accomplish recovery of the mouse. The mouse may be included in a new multi-species recovery plan being prepared by the newly established West Coast Clapper Rail Recovery Team.

**M**anagement needs include protection of much more habitat; emphasis on the protection of nontidal salt marshes, particularly in south San Francisco Bay, through the enforcement of the Clean Water Act and the Federal Endangered Species Act; and periodic surveys (at least every three years) to determine distribution, relative abundance, quality and extent of habitat at all sites and threats to the sites.

**T**he population trend is considered to be declining due to loss of habitat through development of residential, commercial and industrial uses in wetlands, flood control and mosquito abatement activities, and freshwater encroachment caused by increased sewage treatment plant discharge.

*John Gustafson*

## Amargosa Vole

*(Microtus californicus scirpensis)*

CA - E (1980)

FED - E (1984)



General Habitat: • Marshes and Swamps

**T**his small mammal has upper parts of pallid neutral gray, underparts of smoky gray, a tail which is brown above and grayish below and feet of brownish-gray. The comparatively short tail, small rounded ears and short legs easily distinguish the vole from other mouse-like rodents. The vole probably eats green emergent vegetation (grasses and herbs) and grass seeds. The Amargosa Vole is a completely isolated subspecies of the California Vole. It is found only along the largely subterranean Amargosa River in Inyo County from the vicinity of Shoshone to the upper end of the Amargosa Canyon near Tecopa. It is discontinuous in distribution, being found in wetland pockets of bulrushes (*Scirpus olneyi*), cattails (*Typha* sp.), saltgrass (*Distichlis spicata*) and willows (*Salix* sp.). The flooding of potential vole habitat during late-summer thunder-storms and extended periods of winter rainfall probably allow permanent occupation of marshes only on the margins of the river's floodplain.

**T**he marsh habitat of the vole has been reduced by burning and grazing of livestock and modified by human encroachment and pumping of ground water. Competition from the exotic house mouse may be a factor endangering the vole. The introduction and establishment of tamarisk (*Tamarix* sp.) into the river's drainage is diminishing vole habitat quality through gradual replacement of bullrush and other marsh plants. Salt from tamarisk leaves on the ground prevents the native marsh plants from reproducing. Most of the known occupied habitat is in private ownership. Adverse-impact categories (see Table III) include water projects, development, introduced predators and competitors, human disturbance, exotic plants, off-road vehicles and climate.

**C**ritical Habitat has been designated by the FWS. A draft recovery plan written by the FWS was circulated for review by interested parties in 1987. The same draft was re-circulated in 1991. The draft plan stated that it is not possible for the FWS to develop criteria for the eventual delisting of this species in the absence of complete information on the ecological requirements of this vole. In order to obtain funding for such studies, the DFG requested Section 6 monies in each of the last three years. No funds have been granted by the FWS. The first DFG five-year status report for the vole was written in 1989. In the report, the DFG recommended to the FGC that the Endangered classification be retained. The BLM has established the Grimshaw Lake Area of Critical Environmental Concern (ACEC), to protect the natural values of the springs and marsh areas on Federal land in the vicinity



# California Brown Pelican

(*Pelecanus occidentalis californicus*)

CA - E (1971)

FED - E (1970)



General Habitat: • Marine; islands, bays, coastal ponds, and sloughs

The Brown Pelican is a large, grayish-brown bird with a long, pouched bill. The adult has a white head and dark body, but the immature is all dark with a white belly. In California the pelican eats surface schooling fishes such as the Pacific mackerel (*Scomber japonicus*), Pacific sardine (*Sardinops sagax*) and northern anchovy (*Engraulis mordax*). The two latter species have declined due to overfishing by humans, and over 90 percent of the pelican diet, based on the most recent food habits studies, consists of the anchovy during the critical pelican breeding season. The California Brown Pelican breeds from the Channel Islands of southern California southward (including the Baja California coast and the Gulf of California) to Isla Isabela, Islas Tres Marias off Nayarit, Mexico and Isla Ixtapa off Acapulco, Guerrero, Mexico. In the past the pelican also bred on Point Lobos (Monterey County), but successful breeding has not occurred there since 1959. The pelican constructs a nest of sticks on the ground. Between breeding seasons pelicans wander as far north as British Columbia, Canada and as far south as Central America.

The breeding populations of the California Brown Pelican can be differentiated into identifiable and geographically separate entities. However, these probably are not isolated breeding groups. The population segment of interest and concern to the DFG is the Southern California Bight (SCB) population, which has shown the major declines that were the impetus for endangered classification. The SCB population consists of those breeding birds on the Channel Islands; Islas de los Coronados off Tijuana, Baja California, Mexico; Isla Todos Santos; and Isla San Martin (the latter two islands are off Baja California). This population typically breeds on West Anacapa Island, Santa Barbara Island, Isla Coronado Medio, and Isla Coronado Norte.

The SCB population is threatened by the following factors: the phenomenon of four successive years (1989-1992) of low productivity (number of young per breeding pair) at the West Anacapa Island and Santa Barbara Island colonies; continued low productivity or colony failure at the Islas de los Coronados; continued presence of relatively high levels of pesticide residues in the tissues of some pelicans; the dependence of the pelican for food primarily on the northern anchovy; the over-fishing of anchovies; the continued threat of an oil spill from tanker traffic in the Santa Barbara Channel in several scales of disaster from the February 1990 spill at

Huntington Beach up to or exceeding that of the March 1989 Valdez spill in Alaska; human and non-human disturbance of the pelican at important central California coast post-breeding roosts; physical injury and death due to fish hooks and entanglement of birds in abandoned fishing line; and disease outbreaks resulting from overcrowding at fish disposal areas in harbors. Adverse-impact categories (see Table III) include development; pesticides, poisons, and contaminants; human disturbance; and disease.

Population numbers are well-known because the SCB nesting colonies are surveyed almost every year. The breeding population had been generally increasing through the 1986 and 1987 breeding seasons but then suffered a precipitous decline in 1988 to about 2900 breeding pairs from about 7200 in 1987. In 1989 the breeding population increased to about 6000 pairs and then fell to about 2400 pairs in 1990. In 1991 about 5000 pairs built nests on Anacapa Island in a split season, but there was a great amount of abandonment during the March storms (during the first part of the nesting season) and at least half the nests of the second part of the season also were abandoned. Many nests on Santa Barbara Island also were abandoned during March. In 1992, prolonged winter storms due to a full El Nino event (warmer ocean waters and associated storms) caused much abandonment of nests; productivity was the lowest since 1978. El Nino also caused food fishes to move out of the SCB to deeper or more northern waters. These dramatic changes from one year to the next illustrate the need to base management decisions for the SCB population on data from more than a five-year period (the period specified in the Federal recovery plan; see below). The Los Coronados breeding colonies have gradually declined to the point of virtual extirpation, probably due to human disturbance.

Management actions for SCB birds include protection of nesting colonies from human disturbance in California; periodic assessment of reproductive success in the SCB (including the 1989 and 1992 {in part} studies which were conducted by DFG contractors using Endangered Species Tax Check-off funds and by NPS personnel); the preparation of a Federal recovery plan in 1983 which gives the following criteria for achieving recovery: the SCB population should be considered for reclassification to Threatened when any five-year mean productivity (number of young fledged per nesting attempt) of 0.7 occurs at a time when the breeding population is at least 3000 pairs, and should be considered for delisting when any five-year mean productivity of 0.9 occurs in a breeding population of 3000 pairs; investigation of the importance of post-breeding areas along the coast of California, Oregon and Washington; disease investigations; and investigation of the effects of waterfowl shooting on pelicans at the Moss Landing Wildlife Area (Monterey County). The first five-year status report for the pelican was written in 1990. In the report the DFG recommended that the pelican retain its classification of Endangered. No survey of the SCB

nesting colonies is planned for 1993 due to lack of funds. Although the DFG annually requests Section 6 funding for colony surveys, no funds have been granted for this project in the last six years. The FWS considers the collection of annual data on pelican breeding success to be a low priority.

**M**anagement needs include revision of the recovery plan to eliminate the concept of *mean* productivity for a five-year evaluation period of CBP status and substitute the concept of *minimum* productivity; revision of the recovery plan to provide for a recovery evaluation period of at least 10 years to replace the current five-year period; revision of the recovery plan to provide for productivity values higher than the current 0.7 and 0.9 as numerical thresholds for reclassification of the CBP to Threatened and for delisting, or to justify the current values; revision of the recovery plan to evaluate current factors which make the CBP vulnerable to extinction in the SCB as a breeding species or at least susceptible to continued endangerment; providing Section 6 funds to the DFG annually for a breeding season survey of SCB nesting populations, in order to obtain data on number of nesting attempts and productivity; providing Section 6 funds to the DFG to undertake recovery plan tasks on pollution monitoring and correlation of annual fishery data to CBP productivity in the SCB, as well as other priority 1 and 2 tasks; development by the FWS of a formal international cooperative program between the United States and Mexico to protect CBP nesting colonies in Mexico (no progress has been made to date); construction by the DFG of a new outer levee and islands in the salt ponds at the Moss Landing Wildlife Area, and management of water levels in the ponds to protect roosting pelicans (not completed to date); employment of a biologist to exclusively conduct CBP breeding season surveys in the Channel Islands; a wider protection zone around the Anacapa Islands (no progress has been made to date); and prohibition of aircraft over Anacapa (no progress has been made to date).

**T**he trend of this population is considered to be declining.

John Gustafson

## California Condor

(*Gymnogyps californianus*)

CA - E (1971)  
FED - E (1967)

General Habitat: ● Chaparral  
● Foothill and Valley Grasslands



**T**he California Condor is North America's largest land bird; its wing span exceeds nine feet. Adults are black with a pink-orange head, and there is a white patch under each wing. It is the only living representative of this genus. Historically, condors were widespread in western North America from British Columbia to Baja California. By the early 1980's, they had been restricted to mountain and foothill grassland and forest habitats in a U-shaped range north from northern Los Angeles County to San Luis Obispo County in the Coast Range and to Tulare County in the western Sierra Nevada. Nesting sites have been mainly on cliffs in the southern part of this range. Foraging areas are primarily in the foothills, where condors feed on carrion, typically cattle, and deer.

**T**he greatest threat to the survival of the condor has been the unnaturally high rate of mortality caused by human activities, directly or indirectly. Probably no single, dominant factor caused the population decline. Adverse impacts have included development, egg predation by ravens, poisons and contaminants, human disturbance, energy development, collecting and shooting. The relative significance of each factor has changed over time. Lead poisoning from the ingestion by condors of lead bullets in carcasses has apparently contributed significantly to the decline. Shooting has long been considered to be an important source of condor mortality, more so in the past than in recent decades. Incidental death from use of strychnine poisoning of predators in the early 20th and in the 19th century may have been another important factor. DDT contamination may have reduced condor reproductive success in the recent past. Unnaturally high incidence of loss of eggs to ravens may be the result of human activities that have benefitted that species. The population declined steadily in recent decades from 120-180 in the 1940's to 25-35 in the late 1970's.

**I**n 1980, an intensive interagency research and recovery program was implemented, but the population decline continued so rapidly that, in a controversial last-ditch effort to avoid extinction, the last remaining birds were trapped for captive breeding. The last wild bird was caught on April 19, 1987. The total population was then only 27 birds, including captured wild birds and incubator-hatched young from eggs collected from nests of the last wild breeding pairs. All birds have been maintained at the Los Angeles Zoo and San Diego Wild Animal Park.

**T**he recovery program plan calls for releasing captive-raised birds to restore the southern California population and to establish at least one separate population elsewhere in the wild after sufficient numbers of condors are produced from eggs laid in captivity. A



fect this species. Several Bald Eagle studies, including population restoration efforts on the Channel Islands, have been supported with Tax Check-off funding assistance. At Catalina, some of the 36 birds released there since 1980 are now breeding, but eggs are not hatching without the intervention of artificial incubation. This is possibly because of DDE contamination, a problem that is continuing to be assessed and is being managed through captive hatching of some of the wild-laid eggs and returning the chicks to wild nests. A second reintroduction effort using translocated eaglets has been under way since 1987 in coastal Monterey County. Also, a captive breeding population is being developed at the San Francisco Zoo. Breeding status of nesting territories and winter population size and distribution are monitored annually by cooperating agencies and individuals.

The breeding population is increasing and the winter population appears to be stable, if not increasing.

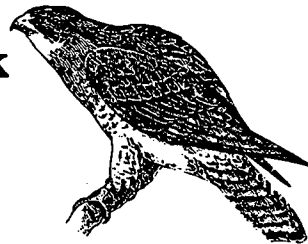
Ron Jurek

## Swainson's Hawk

(*Buteo swainsoni*)

CA - T (1983)

FED - None



General Habitat: • Valley and Foothill Grassland

The Swainson's Hawk is a medium-sized buteo with relatively long, pointed wings and a long, square tail. The species occurs in three main color morphs: light, rufous and dark, with intermediates, all of which have been observed in California populations. Adult birds have dark brown heads with a dark breast band which is set off from a lighter-colored belly in lighter morph birds. In dark birds, however, the entire body may be a sooty-brown to black color. The throat is white or partially white in dark birds. The wings are bi-colored underneath with the wing linings generally lighter than the dark flight feathers. Adult females weigh 28 to 34 ounces and males 25 to 31 ounces.

Swainson's Hawks breeding in California spend the winter in South America as far south as Argentina. The diet of the Swainson's Hawk is varied with the California Vole (*Microtus californicus*) being the staple in the Central Valley. A variety of birds and insects are also taken. Swainson's Hawks often nest peripheral to riparian systems of the valley as well as utilizing lone trees or groves of trees in agricultural fields. Valley oak (*Quercus lobata*), Fremont cottonwood (*Popu-*

*lus fremontii*), walnut (*Juglans hindsii*) and large willow (*Salix* spp.) with an average height of about 58 feet (41-82 feet) are the most commonly used nest trees in the Central Valley. Swainson's Hawks in the Great Basin area of the State (northeastern counties) occupy the juniper-sagebrush community typical to the area. Junipers (*Juniperus occidentalis*), with an average height of 15 feet are most commonly used as nest trees in the Great Basin. The diet of Great Basin populations of Swainson's Hawks consists of montane meadow voles (*M. montanus*) and Belding's Ground Squirrels (*Spermophilus beldingi*).

Swainson's Hawks require large, open grasslands with abundant prey in association with suitable nest trees. Suitable foraging areas include native grasslands or lightly-grazed pastures, alfalfa and other hay crops and certain grain and row croplands. Unsuitable foraging habitat includes row crops in which prey are scarce or unavailable due to the density of the vegetative cover. Those include vineyards, orchards, rice, corn and cotton crops. Suitable nest sights may be found in mature riparian forest, lone trees or groves of oaks and other species in agricultural fields and mature roadside trees. Over 85 percent of Swainson's hawk territories in the Central Valley are in riparian systems adjacent to suitable foraging habitats.

Swainson's Hawks were once found throughout lowland California and were absent only from the Sierra Nevada, north coast ranges and Klamath Mountains and portions of the desert regions of the State. Today, Swainson's Hawks are restricted to portions of the Central Valley and Great Basin regions of the State where suitable nesting and foraging habitat is still available. In the Central Valley, the trend toward planting of more and more crops that are unsuitable for Swainson's Hawks (e.g., vineyards, orchards, rice) and urban expansion onto surrounding agricultural and grassland areas further threatens the population. Residential and commercial development of foraging habitat is becoming increasingly prevalent in the center of Swainson's Hawk distribution in the Central Valley, particularly in Yolo, Sacramento and San Joaquin counties (see Table III).

During historic times (Ca. 1900) Swainson's Hawks may have maintained a population in excess of 17,000 pairs. Today the statewide population is estimated to be only about 550 pairs. If current trends of agricultural and urban expansion continue, the remnant population may decline to the point of endangerment. Breeding populations of Swainson's Hawks are monitored each year to determine trend and condition of habitat. Banding and color marking studies are ongoing in the Great Basin region, and recently radio-te-



lemetry was used to monitor Swainson's Hawk movements in the Central Valley. Management needs of the Swainson's Hawk include ensuring availability of suitable nesting and foraging habitat through preservation of riparian systems and lone and groves of mature trees in agricultural fields, and maintenance of compatible (with the Swainson's Hawk) agricultural practices in grasslands, pastures and croplands.

Compatible agriculture is essential to the maintenance of current Swainson's Hawk populations. The loss of agricultural lands to various developments is a serious threat to Swainson's Hawks throughout California (see Table III). Additional threats are posed by habitat loss due to bank protection projects, expansion of incompatible agriculture, shooting, pesticide poisoning of prey animals, competition from other raptors and human disturbance at nest sites (see Table III).

Developing a cooperative effort between DFG and private landowners is crucial to the effectiveness of habitat management programs since 95 percent of known territories in the Central Valley are on private lands. Swainson's Hawks in the Great Basin exist on both private and public (BLM and USFS) lands. The widespread use of pesticides and rodenticides within the range of the Swainson's Hawk is cause for concern. Besides the direct and sublethal effects on adult and young birds caused by pesticides, there is a definite impact on potential prey animals upon which Swainson's Hawks depend. No statewide management plan has been prepared for the Swainson's Hawk. However, some local conservation planning efforts are underway in San Joaquin and Yolo counties. Study and monitoring programs that are part of mitigation requirements for a levee reconstruction project on the Sacramento River have yielded valuable information on reproductive biology of Swainson's hawks during 1990-92. Efforts to develop a recovery plan will commence in 1993.

Currently the population is declining statewide.  
*Ron Schloff*

## American Peregrine Falcon

(*Falco peregrinus anatum*)

CA - E (1971)

FED - E (1970)

General Habitat: • Many Habitats



Adult peregrines are slate gray above and light below, and the dark cap of the head extends to the cheeks. The wingspan exceeds three feet. The range includes most of California during migrations and in winter, except in deserts. The California breeding range, which has been expanding, now includes the Channel Islands, coast of southern and central California, inland north coastal mountains, Klamath and Cas-

cade ranges and the Sierra Nevada. Nesting sites are typically on ledges of large cliff faces, but some pairs are nesting on city buildings and bridges. Nesting and wintering habitats are varied, including wetlands, woodlands, other forested habitats, cities, agricultural areas and coastal habitats. They feed on birds that are caught in flight.

Pairs formerly nested commonly in most of the State, but only about ten breeding pairs were known by the mid 1970's. The decline was attributed to the effects of DDT, which caused failure of eggs to hatch. Restrictions on use of DDT and intensive recovery efforts have helped to restore breeding to some areas of the State. The known number of breeding pairs has increased from 39 in 1980, to 70 in 1985, 90 in 1989, and 113 in 1992. Part of the increase is owing to the now-terminated program of annual releases to the wild of captive-hatched birds.

Under the Pacific Coast Recovery Plan for the peregrine falcon (1982), management has been directed to augmenting natural productivity by releasing large numbers of young, captive-hatched birds through various means. The Santa Cruz Predatory Bird Research Group produces peregrine chicks from the incubator-hatching of eggs laid by captive peregrines or of thin-shelled eggs collected from poorly reproducing pairs in the wild. Some young are released to the wild into active nests of peregrines or of prairie falcons. Others are hand reared in "hack" box nests for release where few peregrines now nest. From 1977 to 1992, 702 peregrines were released to augment natural productivity of the growing number of wild breeding pairs in California. This part of the recovery program is gradually being phased out owing to the success of recovery efforts. Other recovery actions include annual surveillance and protection of nest sites; sampling of eggs for contaminant analyses; environmental review and restrictions on developments and disturbances near nest sites; creation or enhancement of nesting ledges; and acquisition of peregrine nesting habitat.

The Federal Section 6 program, the Environmental License Plate Program and Endangered Species Tax Check-off funds greatly supported much of this program through 1991, when funding was discontinued. Ecological Reserves protect habitats of several breeding pairs. Two western U.S. Peregrine Falcon Recovery Teams were replaced by one team in 1989 as part of Federal changes in administration of the nationwide recovery effort, and an interstate working team has been established to aid coordination. The multi-agency California Peregrine Falcon Working Team provides recovery program guidance to cooperators. An interagency memorandum of understanding was signed in 1988 to ensure the adequacy of annual surveys for a five-year period to provide information needed for eventually reevaluating its endangered status.

The breeding population trend is stable/increasing, with population increases in most regions of the State but with little or no improvement in others.

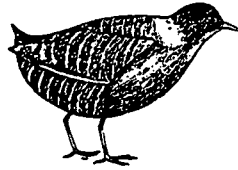
Ron Jurek

## California Black Rail

(*Laterallus jamaicensis coturniculus*)

CA - T (1971)

FED - None



General Habitat: ● Marshes and Swamps

This rail is tiny, about the size of a sparrow, and is blackish in color, with a small black bill, a back speckled with white and a nape of deep chestnut. Little is known about food habits, but apparently the rail eats arthropods. This species historically was known or thought to occur as a breeder from the San Francisco Bay area (including the Sacramento/San Joaquin Delta) south along the coast to northern Baja California, in the San Bernardino/Riverside area, at the Salton Sea and along the lower Colorado River north of Yuma in California and Arizona. The coastal populations included those at Morro Bay and San Diego. Wintering birds were found in the breeding areas and also at Tomales Bay. The rail now is probably absent as a breeder from coastal southern California. Its status as a breeder in the Riverside area is unknown. The species is known to inhabit saltwater, brackish and freshwater marshes. Vegetation in marshes utilized by this species varies from almost pure pickleweed (*Salicornia* sp.) to sedges (*Carex* sp.) and saltgrass (*Distichlis* sp.) to bulrushes (*Scirpus* sp.) and cattails (*Typha* sp.).

The major threat to the existence of the rail in California is the loss and degradation of its habitat. Adverse-impact categories (see Table III) include water projects, development, agriculture, and flood control. The Arizona Game and Fish Department has expressed concern about the rail along the lower Colorado River, which was subjected to extremely high water flows in 1983.

The California Black Rail is not listed in the most recent Federal Register notice of review of vertebrate species dated November 21, 1991. However, the notice does list the Black Rail as a species, with all of its subspecies including the California one as category 2. This means that the FWS currently has information which indicates that the Black Rail may deserve to be proposed as Endangered or Threatened, but that con-

clusive data on biological vulnerability and threat are not available.

The first DFG five-year status report for the rail was written in 1987. In the report, the DFG recommended to the FGC that the Threatened classification be retained. Using Endangered Species Tax Check-off funds, the DFG contracted for a field study of the rail in 1988 to determine the distribution and relative abundance in the greater San Francisco Bay area. In 1989, also using tax check-off funds, the DFG contracted for a field study to determine distribution and relative abundance along the lower Colorado River and in the Imperial Valley. The 1988 and 1989 studies revealed that the rail is suffering a progressive decline due to pervasive and ongoing habitat loss and degradation. There is no active management of habitat for the rail.

The management needs of the rail are as follows: cooperation of Federal, State and local agencies in the development of programs to protect habitat; protection of wetlands through acquisition, easement or other means and management of these wetlands for the rail; restoration of degraded wetlands, including establishment of a high marsh component in those marshes; periodic surveys (at least every two years) to determine distribution, numbers, quality and extent of habitat at all sites and threats to the sites; classification as Endangered or Threatened by the Federal government; reclassification by the FGC as Endangered; studies of life history requirements, especially those of nesting habitat and food habits; and preparation of a State management plan which would incorporate the elements of protection and restoration of habitat, cooperative programs and surveys and studies.

The population trend for this species in California is considered to be declining due to loss of coastal salt marshes, inland freshwater marshes and Colorado River marsh habitat.

John Gustafson

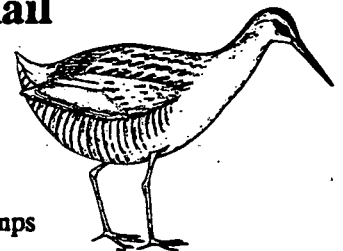
## California Clapper Rail

(*Rallus longirostris obsoletus*)

CA - E (1971)

FED - E (1970)

General Habitat: ● Marshes and Swamps



This coot-sized marsh bird is slightly larger and grayer than the southern California subspecies of

birds

the Clapper Rail. The Clapper Rails generally are gray-brown above and buffy-cinnamon below. The cheeks are brownish-gray, and the flanks are barred with black and white. The orangish bill is long and slightly downcurved. The California Clapper Rail eats a variety of invertebrates including mollusks and crustaceans. It is presently a resident of San Francisco Bay and was formerly found at Humboldt Bay (Humboldt County), Morro Bay (San Luis Obispo County) and Elkhorn Slough (Monterey County). This species is a year-round inhabitant of cordgrass (*Spartina foliosa*) marshes at Dumbarton Point, Mowry Slough and Arrowhead Marsh in Alameda County, the Palo Alto Baylands in Santa Clara County, the Faber Tract, Greco Island and Bair Island in San Mateo County, the Corte Madera Marsh Ecological Reserve, Muzzi Marsh and Gallinas Creek in Marin County and may be present year-round in Suisun Bay in Solano County. During the spring breeding season smaller numbers utilize brackish marshes in the Napa Marsh and south San Francisco Bay. Current estimates are for a population of as few as 500 individuals (slightly higher than last year's estimate) in the south San Francisco bay. In the rest of the range there are 300 to 500 birds.

**D**ramatic loss and degradation of its tidal marsh habitat has led to the endangerment of the rail. The rail is threatened today by pollution from sewage effluent, industrial discharges and urban run-off, which are contaminating its food resources. Fresh-water discharges from sewage treatment plants in the south bay have converted much of its salt marsh habitat into brackish marsh with limited value for this species. Introduced non-native cordgrass (*Spartina* sp.) which could negatively affect the rail's habitat has appeared at a number of salt marshes around the bay. About 1984 the non-native red fox appeared in Alameda County. This predator is probably responsible for recent drastic declines in the rail population in the San Francisco Bay National Wildlife Refuge (NWR), formerly the stronghold for this species. Adverse-impact categories (see Table III) include development; introduced predators and competitors; agriculture; pesticides, poisons, and contaminants; exotic plants; and flood control.

**M**anagement activities include protection of habitat, occasional surveys of local populations, evaluation of the affects of red fox predation and fresh-water discharges, and partial implementation of a Federal recovery plan. In September 1990 the FWS issued a major new release from its Portland, Oregon regional office. Asking "Is San Francisco Bay about to be 'derailed'?", the news release correlated the recent rapid decline of the rail in the south bay with the rapid increase in the population of red foxes. The FWS revealed that Federal biologists had found the remains of three rails near the entrances of two active fox dens in April 1990.

**I**n March 1991 the FWS released its environmental assessment which evaluated the effects associated with the im-

plementation of a predator management program on the NWR. The assessment proposed to implement a program to reduce the number of selected predators and increase the density and production of endangered species and colonial nesting waterbirds on the NWR. A primary focus of the predator-reduction program is the non-native red fox; a primary beneficiary is the California Clapper Rail. Following public review of the final environmental assessment, the FWS began a program of predator control on NWR lands.

**I**n September 1991, using Section 6 funds, the DFG contracted with the U.S. Department of Agriculture, Animal Damage Control, to conduct a red-fox-control program on non-Federal lands in the San Francisco Bay area. The purpose of the program is to benefit the California Clapper Rail. Work to remove foxes from marshes continued into late 1992. Immediate benefits were realized as the number of rails in eight south bay marshes doubled between 1991 and 1992, based on winter censuses conducted during high tides.

**I**n July 1991 the FWS established a West Coast Clapper Rail Recovery Team, upon which the DFG is represented, to address conservation issues for both the Clapper Rail and the Light-footed Clapper Rail. Separate recovery plans were prepared for these species in the past, but both plans require revision to adequately address marsh restoration and the impact of the red fox on both rails. Now one plan will be prepared by the new team that will include both species. This plan also may address the conservation needs of the Salt-marsh Harvest Mouse. The recovery team will advise the FWS regional director in Portland as to whether a captive breeding program is necessary for either rail and whether translocation (movement of animals by humans from one site to another) is required.

**M**anagement needs include an annual range-wide survey; long-term population studies through banding; investigation of life history and habitat requirements; restoration of tidal salt marshes; examination of the effects of exotic vegetation; revision of the recovery plan to address the impact of foxes on rails and the possible need for captive breeding and translocation; and annual red-fox control.

**T**he population trend for this species has been declining until 1992. Based on the results of less than two years of red-fox control, the trend can presently be described as stable/declining.

John Gustafson

significantly declined in the interim.

Ron Jurek

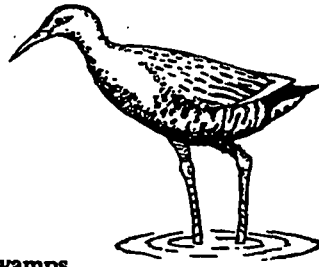
## Yuma Clapper Rail

(*Rallus longirostris yumanensis*)

CA - T (1971)

FED - E (1967)

General Habitat: ● Marshes and Swamps



This rail is the most slender and pale of the three Clapper Rail subspecies in California. The clapper rails generally are gray-brown above and buffy-cinnamon below. The cheeks are brownish-gray, and the flanks are barred with black and white. The bill is long and slightly downcurved. The Yuma Clapper Rail eats mostly crayfish but also small fishes, isopods, insects, clams and seeds. Although some individuals may move southward into Mexico during the winter, the rail generally is a resident of shallow, freshwater marshes containing dense stands of cattails (*Typha latifolia*) and bulrushes (*Scirpus acutus*) along the lower Colorado River from California and Arizona into Mexico. It is also found at the Salton Sea in Imperial County, California.

The rail is threatened by loss of habitat due to human-caused river flooding, so-called reclamation projects and mosquito abatement activities. Great concern has been expressed about the effects of high water in the river in 1983 on rail reproduction and habitat. The status in Mexico is not known. The status of the rail in Imperial County agricultural drains and the deltas of the New and Alamo rivers is uncertain. Adverse-impact categories (see Table III) include water projects, development, agriculture, exotic plants, and flood control.

Management actions include organization in the 1970's by the FWS of agency personnel into a recovery team; completion of a recovery plan in 1983; periodic surveys of Colorado River and Imperial Valley marshes; habitat protection at State and Federal wildlife refuges; and a three-year study of rail life history funded by the Bureau of Reclamation.

The latter study was completed in December 1987 and a final report was issued by the Bureau in July 1989. The author's recommendations for research and management for rails include preparation and implementation of management plans on Federal and state management areas; creation and management of wetlands; new research on captive birds to clarify nesting biology, vocalizations, design of call counts, and reproductive problems associated with selenium; standardization and continuation of call-counts (annually on standardized routes, riverwide every three years); cooperative efforts with Mexico to preserve habitat in the Colorado River

Delta; continued listing of Yuma Clapper Rails as Endangered until habitat is stabilized and reproductive effects of selenium are clarified; retention of an interagency team to oversee all counts; no net loss in habitat area; and more oversight on projects conducted within or adjacent to marsh habitats. The author also stated that future recovery efforts for Yuma Clapper Rails should emphasize implementation and evaluation of management recommendations rather than large-scale additional basic research. The DFG has attempted to obtain Section 6 funding in each of the last four years for a study to determine the effects of wetland management practices on the habitat of the rail. However, the FWS considers this to be a low-priority project.

Management needs include regular assessment of populations in the U.S. and Mexico, greater protection of existing habitat through protection in Mexico and through control of river flows by the Bureau, removal of exotic vegetation from rail habitat, creation and enhancement of rail habitat on State and Federal refuges, implementation of the other recommendations in the Bureau's 1989 report, and funding of a study to determine the effects of wetland management practices on rail habitat.

The population trend for this species is considered to be stable/declining due to loss of marshes along the lower Colorado River and to land-management practices in Imperial County.

John Gustafson

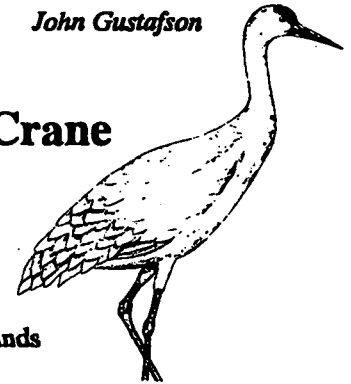
## Greater Sandhill Crane

(*Grus canadensis tabida*)

CA - T (1983)

FED - None

General Habitat: ● Inland Wetlands



Greater Sandhill Cranes are the largest of the six subspecies of Sandhill Cranes. Average adult male weight is about 168 ounces, while females average about 135 ounces. Except for the above size differences, sexes are similar. General coloration is pale gray with darker primaries. The birds' cheeks, ear coverts and chin are white, and all but juveniles have bare, reddish foreheads. Fledged young are similar in size to adults but may be distinguished by rust-brown feathers on the nape. Greater Sandhill Cranes eat a variety of foods but are primarily vegetarians. The diet may include roots, tubers, grain, toads, frogs, eggs, young birds, small mammals and various invertebrates.

Historically, Greater Sandhill Cranes nested in eastern Siskiyou County, northeastern Shasta County and southward to Honey Lake, Lassen County. Intensive surveys con-



ducted under DFG contracts and as independent research in 1971, 1981 and 1988 have delineated the range and estimated current population size in California. Presently, Greater Sandhill Cranes nest in Lassen, Modoc, Plumas, Shasta, Sierra and Siskiyou counties. During 1988 greatest numbers occurred in Modoc County (165 pairs), Lassen County (75 pairs), Siskiyou County (27 pairs) and Plumas County (seven pairs). Shasta and Sierra counties each had a single pair. No surveys have been conducted since 1988.

In California Sandhill Cranes establish territories in wet meadows that are often interspersed with emergent marsh. California birds tend to nest in rather open habitat; however, in certain areas, they nest in association with a dense cover of bulrush (*Scripus* spp.) and burreed (*Sparganium* spp.). Nests are generally built over water with an average depth of about two inches, but conditions can range from dry land to 13 inches of water. Nesting territories contain moist soil to enable young birds to forage for invertebrates during the first few weeks of life. After the young have fledged, cranes will move to grain fields and other suitable habitats near favorable roost sites.

Favorable roost sites and an abundance of cereal grain crops characterize the Greater Sandhill Cranes' Central Valley wintering ground. Rice is used extensively by cranes near the Butte Sink area of Butte County, and corn is the principal food source at most other Central Valley winter concentration areas, particularly in the Sacramento-San Joaquin Delta near Lodi, San Joaquin County. Irrigated pastures are chosen for loafing sites throughout the wintering ground. A communal roost site consisting of an open expanse of shallow water is a key feature of wintering habitat. Most concentration areas on wintering grounds are within a few miles of secure roost sites that often can accommodate several thousand cranes (both Greater Sandhill Cranes and the more common subspecies, the Lesser Sandhill Crane, share the wintering ground in central California). Since both Greater Sandhill Cranes and Lesser Sandhill Cranes intermix on the wintering ground in California, it is difficult to accurately estimate populations. The estimate for Greater is between 3,400 and 6,000 individuals. There are about 25,000 Lesser Sandhill Cranes wintering in California each year. Annual population monitoring is conducted on both the breeding and wintering ground in California, with a focus on the threatened Greater subspecies. Studies conducted on wintering grounds in California and breeding grounds in Oregon, particularly at Malheur National Wildlife Refuge, indicate the population is not producing enough young to maintain stability. Cranes are very long-lived in the wild (20+ years), and it may be years before the low recruitment

rates result in population declines. However, the problems of habitat destruction, disturbances, predation and mower-caused mortality persist on the breeding grounds in California, Oregon and other areas (see Table III). Although Federal listing is not imminent, all breeding populations are being closely monitored.

The 1988 study of breeding populations was supported by the tax check-off fund. This fund also supports staff assigned to develop research and management programs involving Greater Sandhill Cranes. The 13,000+ acre Ash Creek Wildlife Area was, in part, purchased to protect breeding habitat for Greater Sandhill Cranes. A 150 acre and a 360 acre parcel in the Delta at Woodbridge Ecological Reserve have been purchased to provide secure roost sites for wintering cranes. Acquisition of key habitats and protection of nesting and wintering areas from destruction and disturbance are important facets of efforts to recover this threatened subspecies. An additional challenge remains to ensure that all of the acquired breeding and wintering habitats receive proper management consideration by DFG to secure maximum benefits to Greater Sandhill Cranes. This is especially important where protection of Greater Sandhill Cranes was used as part of the justification for the acquisition. The Department is attempting to develop management strategies sensitive to Sandhill Cranes and their habitats through research and monitoring efforts currently being conducted in the Butte Sink area of the northern Central Valley. However, this species continues to be threatened by agricultural conversion of habitat, predation, human disturbance, collisions with power lines, various forms of development, and land management conflicts on State Wildlife Areas, Federal Refuges, and National Forests (see Table III). An effort will be made to develop a revised Pacific Flyway management plan in 1994. This plan will form the basis for a State recovery plan for the species in California, due to be completed in 1995.

The population trend of this species is stable/declining.

Ron Schlorff





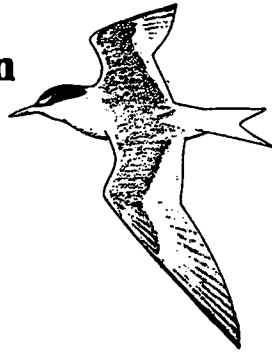
## California Least Tern

(*Sterna antillarum browni*)

CA - E (1971)

FED - E (1970)

General Habitat: ● Coastal Dunes  
● Strand



This is our smallest tern; it is about nine inches long with a 20-inch wingspread. It is mostly white and pale gray; wingtips are black. The head of the adult has a black cap and white forehead and the yellow beak is black-tipped. This migratory bird winters somewhere in Latin America, but the winter range and habitats are unknown. The nesting range is along the Pacific coast from southern Baja California to San Francisco Bay; terns usually arrive in California in April and usually depart in August.

They nest in colonies on bare or sparsely vegetated flat substrates near the coast. The historical nesting habitats of this species have been largely eliminated by development and recreation use. Typical nesting sites are now on isolated or specially protected sand beaches or on natural or man-made open areas in remnant coastal wetlands. These sites are typically near estuaries, bays or harbors where small fish are abundant. Pairs lay usually two eggs in a shallow nest depression they make in the ground.

Formerly nesting in colonies of up to thousands of birds each, the total number of breeders found in California in the mid-1970's was only about 600 pairs. Through intensive, annual protection and site management, they increased from about 800 known pairs in 1978 to 1,000-1,300 pairs during 1983-1990, reaching 1,700 pairs in 1991 and 1,960 pairs in 1992.

About 40 colony sites, or complexes of sub-colonies, have been active at one time or other in recent years, but the number of them occupied by breeding pairs has stayed at about 30 per year, distributed in the San Francisco Bay area and from San Luis Obispo County to the Mexican border. None of the colonies could survive long without continual protection from threats to the birds or their nesting and feeding habitats and without habitat enhancements.

Adverse impacts include wetland development, introduced predators, unnaturally heavy predation by native species, human disturbance and off-road vehicles. El Niño ocean conditions may diminish coastal fish food supplies of the terns and reduce breeding success, such as might have occurred in the mid 1980's and 1992. Spring rains and extreme high tides occasionally flood nest sites. Colonies are subjected to many detrimental factors, such as weed overgrowth, human disturbance and predation. These problems are exacerbated

where terns now have available to them as nesting substrates only land fills, dikes, paved areas or other artificial substrates in remnant or degraded wildlife habitats. Many colonies are continually threatened by human disturbance and by development pressures on nesting and feeding areas. A major continuing threat to the nesting colonies is heavy predation on adults, eggs or chicks by birds of prey, domestic cats, other mammalian carnivores, gulls and many other species, including ground squirrels and meadowlarks. American Kestrels and introduced red foxes have been significant predators at many sites.

The 1980 California Least Tern Recovery Plan stresses the importance of annual breeding population surveys and site management and protection activities. Site preparation and protection, population surveys, and monitoring of threats entails annual recruiting and coordination of many agency biologists, contracted site monitors, and dedicated community volunteers. Fencing, trapping, other predator control measures and protection from human disturbances have contributed significantly to improving tern nesting success and increasing population size in many of the existing colonies in recent years. However, there has not been a significant expansion of the breeding range nor increase in the number of colonies. Establishment of new nesting sites, as is now under way at the mouth of the Santa Ana River and in the vicinity of Ballona Marsh, is urgently needed to make alternative nesting areas for existing colonies and to allow for expansion of the population. An interagency Least Tern working team was forced to become inactive in 1991 due to a shortage of staffing.

Despite increases in the population in recent years, there has been no net change in the number of breeding colonies occupied each year, so during the past decade, population status has been stable.

Ron Jurek

## Marbled Murrelet

(*Brachyramphus marmoratus*)

CA - E (1992)

FED - T (1992)



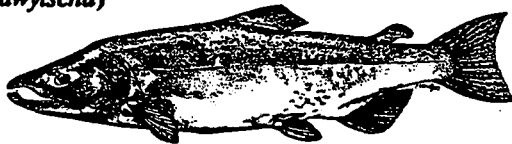
General Habitat: ● North coast conifer forests

The Marbled Murrelet is a small seabird that ranges along the Pacific coastline from the Aleutian Archipelago in Alaska to central California. It is approximately robin-sized and short and chunky in appearance, with a thick neck, and stubby wings. Winter coloration is blackish-gray above and white below; scapulars are white and form a horizontal band. Breeding plumage is black-brown above, with brown and white marbling below. The legs are set far back on the body,

## Winter-run Chinook Salmon

(*Onchorhynchus tshawytscha*)

CA - E (1989)  
FED - T (1990)



General Habitat: ● Sacramento/San Joaquin drainage  
● Sacramento River

The Sacramento River winter-run chinook salmon is a distinct race. Other races using the Sacramento River are the fall-run, the late fall-run, and the spring-run. These races are distinguished by the timing of adult upstream migration, spawning, egg incubation, juvenile downstream migration, younger age at spawning, lower fecundity, rapid upstream movement of adults and extended holding-staging period of adults. Sacramento winter-run chinook salmon only occur in California and virtually all spawning is limited to the Sacramento River. Adult winter-run leave the ocean and migrate upstream through the Delta into the Sacramento River from November through June. Upstream movement past the Red Bluff Diversion Dam (RBDD) occurs from mid-December through early August. Downstream migrant juveniles begin moving past RBDD in early July with outmigration continuing into March; peak movement may occur between mid-October and mid-December. Juveniles may appear in the Delta as early as September, especially when fall storms cause high Sacramento River discharge. Peak outmigration through the Delta appears to occur during February and March. In some years, seaward migration can last into May.

The threats to this population are blockage of fish passage by dams, numerous unscreened diversions in the Sacramento River, excessive water temperatures, poor water quality, and water diversions in the Delta.

The winter-run chinook salmon population in California has declined greatly in recent years. Compared with the 60,000 to 120,000 spawners typical of the 1960's, the annual run size dropped to a 5-year average in the mid-1980's of 2,000 fish. The spawning escapement dropped to 547 fish in 1989; 441 fish in 1990; and a record low of 191 fish in 1991. The 1992 spawning escapement estimate of 1,180 fish represents a six-fold increase over the 1991 estimate; however, low returns of winter-run chinook salmon are expected for the next several years.

The National Marine Fisheries Service (NMFS) published a proposed rule to designate critical habitat pursuant to the Endangered Species Act (ESA) in August, 1992. The Department of Fish and Game reviewed the proposed rule in November, 1992 and commented favorably but recommended including additional areas of critical habitat.

In 1989, the U.S. Fish and Wildlife Service (Service) initiated an artificial propagation program at Coleman National Fish Hatchery for the restoration of the seriously declining population. In 1991, the Service augmented the propagation program with an experimental captive rearing program. Through this program approximately 1,000 captive broodstock juveniles were produced. They will be reared in captivity at two sites, U.C. Davis, Bodega Marine Laboratory and Steinhart Aquarium (California Academy of Sciences), until sexual maturity with subsequent transfer back to Coleman National Fish Hatchery for use as adult broodstock.

A Federal Recovery Team has been assembled to develop a winter-run chinook salmon draft recovery plan for the NMFS. The Recovery Team began meeting on a monthly basis in September, 1992. A draft recovery plan is expected to be prepared by the fall of 1993, and will describe the natural history and present status of winter-run chinook salmon. It will include management actions, ongoing research, known and potential impacts, and specific recommended recovery actions. Ongoing management actions and research studies to be included in the recovery plan are (1) structural and operational changes at Shasta Dam to provide suitable water temperatures for spawning and egg incubation below the dam, (2) control and treatment of water pollution from Iron Mountain Mine, (3) correct fish passage and juvenile stranding problems at Anderson-Cottonwood Dam, (4) correct fish passage problems at RBDD (5) initiate measures to control squawfish predation at Red Bluff Lake (6) restore spawning habitat in the Redding area (7) modify the fish trap at Keswick Dam to prevent mortality (8) fishery harvest restrictions to protect adult spawners (9) continuation of a winter-run propagation program at Coleman National Fish Hatchery (10) continuation of the captive broodstock program (11) take corrective action on the numerous unscreened agricultural diversions along the Sacramento River (12) continue outmigrant monitoring (13) conduct temperature tolerance experiments (14) continuation of run-size monitoring and adjust methodology as needed, and (15) conducting genetic studies. These management and research actions will contribute to the recovery of this unique species.

The population trend for the winter-run chinook salmon is stable/declining.

Deborah McKee  
Kathleen Perry

## Pismo Clarkia

(*Clarkia speciosa* ssp. *immaculata*)

CA - R (1978)

FED - PE (1991)

General Habitat: ● Chaparral  
● Cismontane Woodland



Pismo clarkia is an erect annual herb in the evening primrose family (Onagraceae). Each flower has four lavender, fan-shaped petals that appear from May to June. This species grows on dry, sandy, often disturbed soils along the margins of chaparral in open grassy sites. This plant is known only from the Pismo Beach area of San Luis Obispo County where there are less than five extant occurrences.

Several historic occurrences of Pismo clarkia in the Pismo Beach area have been destroyed by residential development. This clarkia is threatened by urbanization, sand mining, and roadside maintenance activities near several populations. Recent unauthorized grading for construction of a sediment detention basin disturbed a portion of one population. All of the habitat is privately owned. TNC has secured voluntary landowner protection of two occurrences and has contacted owners of several others. The status of this plant is in need of review and protective strategies should be developed. This species was proposed for federal listing as endangered by USFWS in December of 1991.

The overall trend for Pismo clarkia is one of decline.

## Springville Clarkia

(*Clarkia springvillensis*)

CA - E (1979)

FED - C1

General Habitat: ● Chaparral  
● Cismontane Woodland



Springville clarkia is an annual herb with simple or branched stems, narrow leaves, and brilliant lavender-pink flowers punctuated by dark purplish basal spots. It is in the evening-primrose family (Onagraceae). This wildflower is restricted to grasslands near the Tule River in the Sierra Nevada foothills of Tulare County. The major portion of its range lies within a six-mile radius, with another population found near Three Rivers, also in Tulare County. One site is protected by DFG, four are on U.S. Forest Service lands, and two are privately owned.

Springville clarkia is threatened by residential development, overgrazing, roadside herbicide spraying and early-season mowing of annual grasses for fire protection. It is a late-blooming species that may not develop mature seed before the grasslands are mowed. DFG owns and protects one of the largest populations on a four and one-half acre site, the Springville Clarkia Ecological Reserve (SCER). Unfortunately, one fence is improperly aligned, so half of the Springville clarkia population on the reserve actually occurs on private land. This could jeopardize the population if the property is sold. The SCER population has been monitored since 1987 to establish baseline population data. In 1990 and 1991 Springville clarkia population size at the reserve showed a dramatic decline, possibly due to high temperatures during the flowering period coupled with severe drought. This site provides educational opportunities for grade-school science students who attend a nearby camp. In 1991 a report was prepared (using California Endangered Species Tax Check-off funds) that summarizes current population data and management strategies for Springville clarkia populations. An educational awareness guide for the SCER was also included in the report and will be distributed at the reserve.

The overall trend for Springville clarkia is one of decline.

## Salt Marsh Bird's-beak

(*Corólyanthus maritimus* ssp. *maritimus*)

CA - E (1979)

FED - E (1978)

General Habitat: ● Marshes and Swamps



Salt marsh bird's-beak is a diffusely-branched annual herb with grayish-green, hairy leaves. This member of the figwort family (Scrophulariaceae) has spikes of flowers with two-lipped petals. Upper petals are beak-like with yellowish tips, and lower petals have a purplish pouch. Salt marsh bird's-beak grows in the higher reaches of coastal salt marshes, where it receives inundation only at higher tides.

Salt marsh bird's-beak was widespread in coastal marshes from Morro Bay, San Luis Obispo County, to San Diego County and northern Baja California. Presently it occurs only in scattered sites at fewer than ten remnant salt marshes. Half of the original occurrences are now extirpated. In California it is currently found at Tijuana Marsh and Sweetwater Marsh (San Diego County), Upper Newport Bay and possibly Anaheim Bay (Orange County), Ormond Beach and Mugu Lagoon (Ventura County), Carpenteria Marsh (Santa Barbara County), and Morro Bay (San Luis Obispo County). Known occurrences are under the control of Federal, State, and local governments, and private owners. Salt marsh bird's-

beak's decline is due to modification of much of its original salt marsh habitat by land filling, dredging for marinas, creation of levees and roads, dumping of dredge spoils, and ORV use. The USFWS Salt Marsh Bird's-Beak Recovery Plan calls for protection of extant sites, restoration of historic sites, and continued field monitoring and biological studies. Through an interagency agreement with CalTrans, researchers at San Diego State University conducted a three year study which identified factors that contribute to the population dynamics of the bird's-beak colonies and presented methods for expanding existing colonies and reintroducing the plant into historic habitat.

The overall trend for salt marsh bird's-beak is one of decline due to habitat destruction.

### Soft Bird's-beak (*Cordylanthus mollis* ssp. *mollis*)

CA - R (1979)  
FED - C1

General Habitat: • Marshes and Swamps

Soft bird's-beak is a sparingly-branched, semiparasitic herbaceous annual plant in the figwort family (Scrophulariaceae). Its stems are covered by soft hairs, and it bears white two-lipped flowers. Soft bird's-beak grows in the coastal salt marshes and brackish marshes from northern San Francisco Bay to Suisun Bay in Napa, Solano, and Contra Costa counties.

There are approximately a dozen historic occurrences of soft bird's-beak, but a 1986 survey confirmed that only three or four remain. One occurrence is located at Benicia State Recreation Area, where a park management plan has been developed. Another site is on DFG land along the Napa River at Fagan Slough, where it may have been damaged by polluted runoff from a municipal water treatment plant. Another occurrence may be adversely affected by residential development. CNPS monitored populations at Martinez Regional Shoreline and Point Pinole Regional Shoreline in 1991. No plants were located in Martinez and several thousand were seen in Pinole. Little current information is available on the ecology of this species. Studies are needed to determine ecological requirements and factors involved in annual population size fluctuations.



The overall trend for soft bird's-beak is one of decline.

### Mount Diablo Bird's-beak (*Cordylanthus nidularius*)

CA - R (1978)  
FED - C1

General Habitat: • Chaparral

Mount Diablo bird's-beak, a member of the figwort family (Scrophulariaceae), is a prostrate to ascending, branched, mat-forming annual with small white and purple-veined flowers. Its interlacing branches form an unbroken mat over the serpentine chaparral habitat in which it grows. The entire global distribution of this unusual bird's-beak consists of one occurrence on the northeast slope of Mount Diablo in Contra Costa County.



Mount Diablo bird's-beak occurs exclusively on Mount Diablo State Park property. The area was burned in 1977, which may have benefitted this species. A 1988 survey indicated that this occurrence, which is bisected by a fire road, is composed of several hundred plants over a two acre area. Although the site is remote and there are no specific known threats, a human-caused fire at the wrong time of year or further road improvements could damage this population. There is currently no active management for this species. CNPS monitored the occurrence in 1991 and reported 800 plants. Establishing a second population would increase the species' prospects for survival.

The trend for Mount Diablo bird's-beak is one of stability.

### Ferris' or Palmate-bracted Bird's-beak (*Cordylanthus palmatus*)

CA - E (1984)  
FED - E (1986)

General Habitat: • Chenopod Scrub  
• Valley and Foothill Grassland

Palmate-bracted bird's-beak is a pale green-gray annual herb in the figwort family (Scrophulariaceae). The plants have spreading branches from the base,



dredged part of the lakebed. He was required to return the excavated material to the site, but the damage was still visible in 1989. The Wildlife Conservation Board purchased the lake and a small area of surrounding habitat in 1988. However, adverse impacts to the site continued as a result of damage from off-road vehicles. The U.S. Fish and Wildlife Service provided funds in 1987 to purchase fencing material and in 1989 a split-rail fence allowing pedestrian access was built. The site is now protected by DFG as Loch Lomond Ecological Reserve. A design is being developed for an interpretive display to be constructed and installed at the lake in 1992.

**T**he trend for Loch Lomond button celery is one of stability.

## Delta Button Celery

(*Eryngium racemosum*)

CA - E (1981)

FED - C2

General Habitat: ● Riparian Scrub



**D**elta button celery, a member of the carrot family (Apiaceae), is a slender, prostrate, herbaceous perennial with greenish, rounded flower heads. It occurs generally on clay soils in lowland areas of riparian and floodplain habitat. Its historic distribution includes Calaveras, Merced, Stanislaus, and San Joaquin counties.

**O**f the approximately 20 known Delta button celery occurrences, about a third have been extirpated by flood control activities and conversion of lowlands to agriculture, including all of the occurrences in San Joaquin County and most in Stanislaus County. The occurrence in Calaveras County has not been seen recently. A new population in Stanislaus County was reported in 1989. Most extant occurrences are found in Merced County along the San Joaquin River. These populations may be threatened by future flood control activities which could change the local hydrology and alter the habitat. Delta button celery occurrences are under private ownership, on USFWS property, and on DFG's Los Banos and North Grasslands Wildlife Areas. Survey and monitoring studies of Delta button celery populations on DFG's China Island and Salt Slough units of the North Grasslands Wildlife Area were conducted in 1992. Information gathered will help in future development of appropriate management strategies on this DFG land. USFWS's San Luis National Wildlife Refuge has an MOU with DFG to examine the effects of different grazing regimes on this species.

**T**he trend for Delta button celery is one of decline.

## Contra Costa Wallflower

(*Erysimum capitatum* var. *angustatum*)

CA - E (1978)

FED - E (1978)

General Habitat: ● Inland Dunes



**C**ontra Costa wallflower, a member of the mustard family (Brassicaceae), is a coarse-stemmed, erect, herbaceous biennial herb with yellowish-orange flowers. Its distinctive habitat consists of stabilized interior sand dunes that currently are densely covered with herbs, grasses, and shrubs. Only two populations remain, both at the 70-acre Antioch Dunes along the San Joaquin River which is near Antioch in Contra Costa County. The area is mainly protected as a part of the USFWS Antioch Dunes National Wildlife Refuge, and by PG&E on its adjoining property.

**L**oss of habitat through sand mining, industrial development, rototilling for fire control, and off-road vehicle activities have left this wallflower on the verge of extinction. The Antioch Dunes Refuge was closed to public use in 1988 to reduce erosion caused by trespass and ORVs. A Recovery Plan for this species and two others endemic to the Antioch Dunes, prepared by USFWS, calls for enhancement of existing populations and establishment of new populations within its historic range. Pacific Gas and Electric designed and paid for enhancement at the Antioch Dunes which was conducted by USFWS. Research on the Antioch Dunes populations has determined that, although Contra Costa wallflower is capable of producing large amounts of seed, seed production can be substantially reduced by environmental limitations such as low pollination rates and insect seed predation. This species retains a large seed bank in the soil and shows some ability to grow on the clay substrate that remains in areas where overlying sand has been stripped away. However, an attempt to experimentally establish plants on this clay substrate was unsuccessful. Since then the Refuge has developed several restoration and management techniques including germination of seeds at Napa Native Nursery, planting of seeds, seed collection, and the establishment of a permanent seed bank. In cooperation with PG&E, the Refuge is creating new dunes using native river sand that will be restored through seeding and the planting of seedlings. Over 2000 seedlings will be planted on the new dunes in early 1992. The wallflower population is surveyed annually and has shown considerable increase since 1978.

**T**he long-term trend for Contra Costa wallflower is one of decline, though recent management activities may help to stabilize the trend.

## San Francisco Lessingia

(*Lessingia germanorum*)

CA - E (1990)

FED - C1

General Habitat: ● Coastal Dunes  
● Coastal Scrub



San Francisco lessingia, a member of the sunflower family (Asteraceae), is a slender annual herb with clusters of lemon-yellow flowers. This species occurs in remnant areas of coastal dune scrub habitat on the San Francisco Peninsula. It appears to require open sandy soils that are relatively free of competing plants. San Francisco lessingia probably evolved on semi-active dunes, for it appears to require some degree of sand movement and disturbance. Historic collections of San Francisco lessingia are all from the San Francisco area, including northern San Mateo County. Today, four natural populations and one experimentally introduced population exist within the Presidio of San Francisco, which is under the jurisdiction of the U.S. Army. These populations are within one half mile of each other on remnant areas of coastal dune scrub habitat. The Presidio occurs within the boundaries of the Golden Gate National Recreation Area, which is administered by the National Park Service. An additional occurrence was discovered in 1989 on San Bruno Mountain in San Mateo County. An HCP is in affect there which protects all endangered species on the mountain.

San Francisco lessingia faces a variety of threats. Damage to lessingia and its habitat has occurred from trampling by hikers, bikers, and joggers. Sand excavation at the Presidio has eliminated most of one population, while proposed development threatens another. All sites at the Presidio have occasional unapproved vehicle use. Disturbance from trampling can directly destroy lessingia plants and encourage the invasion of competing exotic plants such as ice plant (*Carpobrotus* sp.). Ice plant threatens San Francisco lessingia at all sites. In addition, pampas grass is encroaching on lessingia habitat on San Bruno Mountain. CNPS volunteers currently weed lessingia sites when possible, which is critical to preventing the displacement of the lessingia by ice plant or other exotics. The current transfer of the Presidio from Department of Defense to National Park Service jurisdiction leaves the direction of future land use in the Presidio uncertain.

Without special protection and management, San Francisco lessingia will continue its declining

trend.

## Congdon's Lewisia

(*Lewisia congdonii*)

CA - R (1982)

FED - None

General Habitat: ● Chaparral  
● Lower Montane Conifer Forest



Congdon's lewisia, a perennial member of the purslane family (Portulacaceae), has a basal rosette of semi-succulent leaves and produces rose-colored flowers. It grows on dry talus slopes and in rock crevices in the chaparral and oak woodland plant communities of the Merced River Canyon, Mariposa County, and along the Kings River Canyon, Fresno County.

Less than ten occurrences of Congdon's lewisia are known and several of these are along roads where herbicide spraying, road improvements and maintenance, and trash dumping are threats. All of the occurrences are on USFS lands. Habitat requirements and reproductive biology of this species are areas for future research. Additional field surveys may result in the discovery of new populations in suitable habitat between the presently known scattered occurrences. Plant surveys are also needed of the areas recently burned in Sierra Nevada forest fires. A draft multi-agency MOU involving CalTrans, the Bureau of Land Management, Pacific Gas and Electric, the U.S. Forest Service and the Department of Fish and Game is now under review. When finalized, it will offer specific protection to several populations of Congdon's lewisia.

The trend for Congdon's lewisia is one of decline.

## Mason's Lilaeopsis

(*Lilaeopsis masonii*)

CA - R (1979)

FED - C2

General Habitat: ● Marshes and Swamps  
● Riparian Forest



Mason's lilaeopsis is a minute, turf-forming perennial plant in the carrot family (Apiaceae). It spreads by rhizomes and produces long, narrow, jointed leaves. This species is semi-aquatic and is usu-

ally found on saturated clay soils which are regularly inundated by waves and tidal action. Its known distribution extends from the margins of the Napa River in Napa County, east to the channels and sloughs of the Sacramento-San Joaquin Delta in Contra Costa, Solano, Sacramento, Yolo, and San Joaquin counties.

**C**urrently, about fifty occurrences of Mason's lilaepsis are known, but many are expected to be lost because of proposed habitat modifications. The cumulative effects of several proposed projects will combine to threaten this species. These activities include flood control projects (rip-rap), widening of Delta channels for water transport, dredging and dumping of spoils, recreational development, and changes in water quality resulting from decreased flows in the Delta. Although much of the habitat is privately owned, several State and Federal agencies have jurisdiction over the Delta waterways. One site is protected in Solano County on a DFG Ecological Reserve. DFG contracted with researchers at San Francisco State University to investigate the habitat characteristics of Mason's lilaepsis. The research was funded by California Endangered Species Tax Check-off funds. DFG entered into a mitigation agreement with the Department of Water Resources in 1988 to transplant populations of Mason's lilaepsis as mitigation for impacts from rock revetment work done in Barker Slough in Solano County. Transplants took place in 1989. The success of the transplants will be determined after five years of monitoring. In response to a 1988 oil spill that contaminated at least two populations, the Shell Oil Spill Litigation Settlement Trustee Committee awarded funds to DFG to initiate research into the restoration and recovery of Mason's lilaepsis. In 1991, DFG entered into an MOU with researchers at San Francisco State University to conduct research on the salt tolerance of Mason's lilaepsis. The future trend for this small perennial herb is one of imminent decline due to numerous modifications planned for its habitat.

**T**he trend for Mason's lilaepsis is one of decline.

## Western Lily

(*Lilium occidentale*)



CA - E (1982)  
FED - PE

General Habitat: ● Coastal Scrub  
● Marshes and Swamps  
● North Coast Conifer Forest

**W**estern lily is a tall perennial herb that arises from a rhizome. It has a slender stem and long, narrow, whorled leaves. The flowers of this member of the lily family

(Liliaceae) are crimson, except at the base of the petals where they are yellow-orange or green with maroon spots. In California this showy lily is known from near the southern perimeter of Humboldt Bay, Humboldt County, and from two newly discovered sites approximately 90 miles to the north in Del Norte County. Another form of this plant occurs along Oregon's coast; this form is somewhat different and hybridizes with *L. columbianum*. In 1991 two new western lily locations were reported in Oregon, one by Harris State Park and one just north of Rainbow Rock.

**W**estern lily is threatened by habitat loss, over-collecting of bulbs, and cattle grazing in its habitat. Yearly monitoring is needed to assess effects of illegal bulb collecting and grazing at all populations. Some measures have already been taken to protect this species. The DFG Table Bluff Ecological Reserve contains a population which is monitored annually. Since 1989, California Endangered Species Tax Check-Off funds have been used for this monitoring. A preserve management plan and a demographic study of western lily are in progress; preliminary results indicate that in areas where shading spruces were thinned, western lily has increased and successfully flowered. TNC has secured voluntary protection agreements with the landowners of three privately owned western lily occurrences. The Crescent City Marsh population, a portion of which occurs within DFG's Crescent City Marsh Wildlife Area, is the largest population known. Another population was discovered in 1991 on Point St. George, northwest of Crescent City. This area is proposed for development and the biological inventory was funded by the Coastal Conservancy.

**T**he overall trend for western lily has been one of decline, but recent monitoring and protection efforts have resulted in a more stable trend.

## Pitkin Marsh Lily

(*Lilium pitkinense*)

CA - E (1978)  
FED - C1



General Habitat: ● Marshes and Swamps

**P**itkin Marsh lily is an herbaceous perennial with tall slender stems, narrow whorled leaves, and showy, nodding yellow-orange flowers with deep maroon dots and red tips. This member of the lily family (Liliaceae) arises from a rhizome. There are three recorded occurrences of Pitkin Marsh lily, only two of which have been seen recently. These occurrences are confined to a small portion of Sonoma County, near fresh water marshes in the vicinity of Sebastopol and Cunningham.